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<b>(54) Title:</b> PACKAGED LIQUID CLEANING PRODUCT  <b>(57) Abstract</b>  A packaged non-aqueous liquid cleaning product comprising a container and a non-aqueous liquid cleaning composition therein, the container being closed by a water-soluble or water-dispersible closure member.		

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PACKAGED LIQUID CLEANING PRODUCT

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This invention relates to packaged non-aqueous liquid cleaning products.

- 10 Liquid cleaning compositions which are substantially free of water are described in the art. The lack of water in such products enables the incorporation therein of unstable or incompatible ingredients such as bleaches or enzymes, although the present invention is applicable even to products which do not contain such ingredients.
- 15 Such products are designed for the cleaning of hardsurfaces, for dishwashing or for fabric washing. The present invention especially applicable to such products as are designed for fabric washing.

- 20 The dosing of such products to automatic machines such as automatic fabric washing machines, can be a problem. The rheology of the product is not always convenient for it to be dispensed via the traditional dispenser drawer, in the same way as powder products may be dispensed.
- 25 Direct pouring of the product either directly onto the articles to be cleaned or into the wash liquor can be messy and inaccurate.

- There is therefore a need to provide a means whereby
- 30 non-aqueous liquid cleaning compositions can be conveniently and accurately dosed to a washing machine.

- We have now found that this objective can be achieved by packaging the composition in a special container which
- 35 is suitable for adding to the machine together with the articles to be cleaned, one or more packages containing enough composition to represent the desired dose.

Thus according to the invention there is provided a packaged non-aqueous liquid cleaning product comprising a container and a non-aqueous liquid cleaning composition therein, the container being closed by a water-soluble or water-dispersible closure member.

The container may take any form consistent with it being included in the machine together with the articles to be cleaned. It may be formed of flexible or rigid material. We have found that a particularly convenient container is of a material that does not dissolve or disperse in water, for example it may have the form of a plastic material bottle having a relatively narrow neck which is closed by the closure member. The use of biodegradable material and/or material of natural origin for the container is preferred.

The closure member may take any convenient form and may be flexible or relatively rigid. It should effectively close the container and while in place prevent spillage of the contents from the container and the ingress of any significant amount of moisture from the surrounding air. The closure member may be secured to the container by any suitable means, such as by being glued thereto or by being physically held in place for example by being a press fit into an aperture of the container. On the other hand it is essential that the closure member should release the contents of the container once in contact with the wash liquor in the machine. It must therefore be soluble or dispersible in water at the temperature of the wash liquor, that is at a temperature between about 0°C and about 90°C. Preferably the closure member is a tablet.

Clearly, the closure member should be formed of such a material that will not significantly disintegrate in contact with the non-aqueous liquid, such contact being likely to occur in storage or in transport.

When the closure member is soluble it should be formed of a material which has such a rate of solubility that, in use, the majority of the contents of the container are released into the wash liquor promptly, say within 5 minutes, such as within 2 minutes. Polyvinylalcohol is a suitable material for forming such a closure member.

The disintegration of the closure member may be encouraged by forming it of such a material or mixture of materials which on contact with water will generate gas, swell or, in the case of the wash liquor having an elevated temperature, melt. In the first of these embodiments the closure member may comprise a water-soluble solid acid such as citric acid or tartaric acid and a water-soluble carbonate or bicarbonate salt so that on contact with water the carbon dioxide generated serves to rapidly disintegrate the closure member. In the second of these embodiments the closure member may include a swellable material, such as a smectite clay, which will swell in contact with water thereby serving to hasten the disintegration of the closure member. Wax-like materials, while not in themselves water-soluble, but which at the elevated temperatures of the wash liquor will become molten may also be included to aid disintegration of the closure member. Wax-like materials, while not in themselves of the wash liquor will become molten may also be included to aid disintegration of the closure member at these temperatures. The closure member may include a material having a high heat of hydration such that on contact with the wash liquor a localised region of elevated temperature is generated thereby to further encourage disintegration.

35

Before use the closure member may be protected against attack from atmospheric moisture, which might occur for example on storage, by being provided with a cover formed of water-impermeable material, such as plastics

or aluminium foil designed to be removed or punctured by the consumer prior to adding the package to the washing machine.

- 5 In a particularly preferred embodiment of the invention, the closure member comprises one or more ingredients which have a useful function in the cleaning process, in particular ingredients which benefit from being dissolved or dispersed in the wash liquor before the  
10 bulk of the non-aqueous liquid and/or are difficult to incorporate in the liquid itself, perhaps because of physical or chemical instability.

Thus, it is preferred that the closure member comprises  
15 one or more ingredients selected from detergency builder, bleach precursors, peroxygen or peracid bleaches, enzymes, polymers for controlling the deposition of soil or insoluble particulate material onto the articles to be cleaned, foam inhibitors and  
20 perfumes.

Non-aqueous liquid cleaning compositions generally comprise a liquid phase containing a surfactant and/or a solvent and a particulate solid phase dispersed therein.  
25

The liquid phase of the product preferably contains a surfactant. The surfactant may make up all or only part of the liquid phase, the remainder being constituted by  
30 a liquid non-surfactant material such as a solvent.

In general, the surfactant may be chosen from the liquid surfactants described "Surface Active Agents" Vol. 1, by Schwartz & Perry, Interscience 1949, Vol. 2 by  
35 Schwartz, Perry & Berch, Interscience 1958, in the current edition of "McCutcheon's Emulsifiers and Detergents" published by Manufacturing Confectioners Company or in "Tenside-Taschenbuch", H. Stache 2nd Edn., Carl Hanser Verlag, 1981.

In this respect nonionic surfactants are especially suitable, most preferably polyalkoxylated nonionic surfactants.

5

Nonionic detergent surfactants are well-known in the art. They normally consist of a water-solubilizing polyalkoxyene or a mono- or di-alkanolamide group in chemical combination with an organic hydrophobic group  
10 derived, for example, from alkylphenols in which the alkyl group contains from about 6 to about 12 carbon atoms, dialkylphenols in which each alkyl group contains from 6 to 12 carbon atoms, primary, secondary or  
15 tertiary aliphatic alcohols (or alkyl-capped derivatives thereof), preferably having from 8 to 20 carbon atoms, monocarboxylic acids having from 10 to about 24 carbon atoms in the alkyl group and polyoxypropylenes. Also  
20 common are fatty acid mono- and dialkanolamides in which the alkyl group of the fatty acid radical contains from 10 to about 20 carbon atoms and the alkyloyl group having from 1 to 3 carbon atoms. In any of the mono- and di-alkanolamide derivatives, optionally, there may be a polyoxyalkylene moiety joining the latter groups and the hydrophobic part of the molecule. In all polyalkoxyene  
25 containing surfactants, the polyalkoxyene moiety preferably consists of from 2 to 20 groups of ethylene oxide or of ethylene oxide and propylene oxide groups. Amongst the latter class, particularly preferred are those described in the applicants' published European  
30 specification EP-A-225,654, especially for use as all or part of the liquid phase. Also preferred are those ethoxylated nonionics which are the condensation products of fatty alcohols with from 9 to 15 carbon atoms condensed with from 3 to 11 moles of ethylene  
35 oxide. Examples of these are the condensation products of C<sub>11-13</sub> alcohols with (say) 3 to 7 moles of ethylene oxide. These may be used as the sole nonionic surfactants or in combination with those of the described in the last-mentioned European specification,

especially as all or part of the liquid phase.

Another class of suitable nonionics which may be incorporated, preferably at most in minor quantities, comprise the alkyl polysaccharides (polyglycosides/ oligosaccharides) such as described in any of specifications US 3,640,998; US 3,346,558; US 4,223,129; EP-A-92,355; EP-A-99,183; EP-A-70,074, '75, '76, '77; EP-A-75,994, '95, '96.

- 10 Nonionic detergent surfactants normally have molecular weights of up to about 11,000. When mixtures of different nonionic detergent surfactants are used, it is preferred that the mixture is liquid at room
- 15 temperature. Mixtures of nonionic detergent surfactants with other detergent surfactants such as anionic, cationic or ampholytic detergent surfactants and soaps may also be used.
- 20 Examples of suitable anionic detergent surfactants, which may be used, preferably at most, in minor quantities, are alkali metal, ammonium or alkylolamine salts of alkylbenzene sulphonates having from 10 to 18 carbon atoms in the alkyl group, alkyl and alkylether
- 25 sulphates having from 10 to 24 carbon atoms in the alkyl group, the alkylether sulphates having from 1 to 5 ethylene oxide groups, olefin sulphonates prepared by sulphonation of C<sub>10</sub>-C<sub>24</sub> alpha-olefins and subsequent neutralization and hydrolysis of the sulphonation
- 30 reaction product.

Other surfactants which may be used, preferably at most in minor quantities, include alkali metal soaps of a fatty acid, preferably one containing 12 to 18 carbon

35 atoms. Typical such acids are oleic acid, ricinoleic acid and fatty acids derived from castor oil or mixtures thereof. The sodium or potassium soaps of these acids can be used. As well as fulfilling the role of surfactants, soaps can act as further detergency



builders or fabric conditioners, other examples of which will be described in more detail hereinbelow. It can also be remarked that the oils mentioned in this paragraph may themselves constitute all or part of the liquid phase, whilst the corresponding low molecular weight fatty acids (triglycerides) can be dispersed as solids or function as structurants.

Yet again, it is also possible to utilise small amounts of cationic, zwitterionic and amphoteric surfactants such as referred to in the general surfactant text referred to hereinbefore. Examples of cationic detergent surfactants are aliphatic or aromatic alkyl-di (alkyl) ammonium halides and examples of soaps are the alkali metal salts of C<sub>12</sub>-C<sub>24</sub> fatty acids. Ampholytic detergent surfactants are e.g. the sulphobetaines. Combinations of surfactants from within the same, or from different classes may be employed to advantage for optimising structuring and/or cleaning performance.

20

Non-surfactants which are suitable for inclusion in the liquid phase include ethers, polyethers, alkylamines and fatty amines, (especially di- and tri-alkyl- and/or fatty- N- substituted derivatives thereof, alkyl (or fatty) carboxylic acid lower alkyl esters, ketones, aldehydes, and glycerides. Specific examples include di-alkyl ethers, polyethylene glycols, polyethylene oxides, glymes alkyl ketones (such as acetone), glycerol, glycerol triacetate, propylene glycol, and sorbitol.

30

The compositions for use in a product of the invention may contain the liquid phase in an amount of at least 10% by weight of the total composition. The amount of the liquid phase present in the composition may be as high as about 90%, but in most cases the practical amount will lie between 20 and 70% and preferably between 30 and 60% by weight of the composition.

The compositions for use in a container according to the present invention preferably also contain one or more other functional ingredients, for example selected from detergency builders, bleaches, and (for hard surface  
5 cleaners) abrasives.

The detergency builders are materials which counteract the effects of calcium, or other ion, water hardness, by precipitation, by an ion sequestering or ion-exchange  
10 effect. They comprise both inorganic and organic builders. They may also be sub-divided into the phosphorus-containing and non-phosphorus type, the latter being preferred in the present invention for environmental reasons.

15 Inorganic builders comprise the various carbonate, silicate-, borate- and aluminosilicate-type materials, particularly the alkali-metal salt forms. Mixtures of these may also be used.

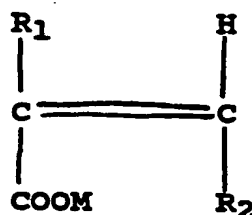
20 Examples of other non-phosphorus-containing inorganic builders, when present, include water-soluble alkali metal carbonates, bicarbonates, borates, silicates, metasilicates, and crystalline and amorphous aluminosilicates. Specific examples include sodium and  
25 potassium silicates and zeolites.

Examples of organic builders include the alkali metal, ammonium and substituted, citrates, succinates,  
30 malonates, fatty acid sulphonates, carboxymethoxy succinates, ammonium polyacetates, carboxylates, polycarboxylates, aminopolycarboxylates, polyacetyl carboxylates and polyhydroxysulphonates. Specific examples include sodium potassium, lithium, ammonium and  
35 substituted ammonium salts of ethylenediaminetetraacetic acid, nitrilotriacetic acid, oxydisuccinic acid, melitic acid, benzene polycarboxylic acids and citric acid. Other, less preferred, examples are organic phosphonate type sequestering agents such as those sold by Monsanto

under the tradename of the Dequest range and  
alkanehydroxy phosphonates.

A carboxylic acid polymer may be present, such as a  
water-soluble homopolymer or a copolymer having a  
molecular weight of at least 500. It may be derived from  
a mono-carboxylic acid or from a di- or poly-carboxylic  
acid. The polymer will be used in its water-soluble  
alkali metal salts form.

One group of polymer materials found to be of value  
comprises homopolymers derived from a monomer of the  
formula



wherein  $R_1$  is hydrogen, hydroxyl,  $C_1 - C_4$  alkyl or  
alkoxy, acetoxy or  $-CH_2COOM$ ,  $R_2$  is hydrogen,  $C_1 - C_4$   
alkyl, or  $-COOM$  and  $M$  is an alkali metal. Examples of  
this group include the sodium and potassium salts or  
polyacrylic, polymethacrylic, polyitaconic, polymaleic  
and polyhydroxyacrylic acids and also the hydrolysis  
products of the corresponding polymerised acid  
anhydrides. Thus the polymer obtained by hydrolysis of  
maleic anhydride falls within this group.

A second group of polymeric materials comprises the  
copolymers of two or more carboxylic monomers of the  
above formula. Examples of this group include the sodium  
and potassium salts of copolymers of maleic anhydride  
with acrylic acid, methacrylic acid, crotonic acids,  
itaconic acid and its anhydride, aconitic acid.

A third group of polymeric materials comprises the  
copolymers of one carboxylic monomer of the above

formula and one or more non-carboxylic acid monomers such as ethylene, propylene, styrene, -methyl styrene, acrylonitrile, acrylamide, vinylacetate, methyl vinyl ketone, acrolein and esters of carboxylic acid monomers  
5 such as ethyl acrylate and methacrylate.

Suitable bleaches include the halogen, particularly chlorine bleaches such as are provided in the form of alkalimetal hypohalites, e.g. hypochlorites. In the  
10 application of fabrics washing, the oxygen bleaches are preferred, for example in the form of an inorganic persalt, preferably with an precursor, or as a peroxy acid compound.

15 In the case of the inorganic persalt bleaches, the precursor makes the bleaching more effective at lower temperatures, i.e. in the range from ambient temperature to about 60°C, so that such bleach systems are commonly known as low-temperature bleach systems and are well  
20 known in the art. The inorganic persalt such as sodium perborate, both the monohydrate and the tetrahydrate, acts to release active oxygen in solution, and the precursor is usually an organic compound having one or more reactive acyl residues, which cause the formation  
25 of peracids, the latter providing for a more effective bleaching action at lower temperatures than the peroxy bleach compound alone. The ratio by weight of the peroxy bleach compound to the precursor is from about 15:1 to about 2:1, preferably from about 10:1 to about  
30 3.5:1. Whilst the amount of the bleach system, i.e. peroxy bleach compound and precursor, may be varied between about 5% and about 35% by weight of the total liquid, it is preferred to use from about 6% to about  
35 30% of the ingredients forming the bleach system. Thus, the preferred level of the peroxy bleach compound in the composition is between about 5.5% and about 27% by weight, while the preferred level of the precursor is between about 0.5% and about 40%, most preferably between about 1% and about 5% by weight.

Typical examples of the suitable peroxybleach compounds are alkalimetal peroborates, both tetrahydrates and monohydrates, alkali metal percarbonates, persilicates and perphosphates, of which sodium perborate is preferred.

Precursors for peroxybleach compounds have been amply described in the literature, including in British patent specifications 836,988, 855,735, 907,356, 907,358, 907,950, 1,003,310, and 1,246,339 US patent specifications 3,332,882, and 4,128,494, Canadian patent specification 844,481 and South African patent specification 68/6,344.

The exact mode of action of such precursors is not known, but it is believed that peracids are formed by reaction of the precursors with the inorganic peroxy compound, which peracids then liberate active-oxygen by decomposition.

They are generally compounds which contain N-acyl or O-acyl residues in the molecule and which exert their activating action on the peroxy compounds on contact with these in the washing liquor.

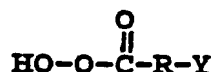
Typical examples of precursors within these groups are polyacylated alkylene diamines, such as N,N,N<sup>1</sup>,N<sup>1</sup>-tetraacetylene diamine (TAED) and N,N,N<sup>1</sup>,N<sup>1</sup>-tetraacetylmethylene diamine (TAMD); acylated glycolurils, such as tetraacetylglycoluril (TAGU); triacetylcyanurate and sodium sulphophenyl ethyl carbonic acid ester.

A particularly preferred precursor is N,N,N<sup>1</sup>,N<sup>1</sup>-tetraacetylene diamine (TAED).

The organic peroxyacid compound bleaches are preferably those which are solid at room temperature and most

preferably should have a melting point of at least 50°C. Most commonly, they are the organic peroxyacids and water-soluble salts thereof having the general formula

5



wherein R is an alkylene or substituted alkylene group containing 1 to 20 carbon atoms or an arylene group  
10 containing from 6 to 8 carbon atoms, and Y is hydrogen, halogen, alkyl, aryl or any group which provides an anionic moiety in aqueous solution.

Another preferred class of peroxygen compounds which can  
15 be incorporated to enhance dispensing/dispersibility in water are the anhydrous perborates described for that purpose in the applicants' European patent specification EP-A-217,454.

20 If the liquid phase comprises an ester formed from an organic acid and an alkoxylated alcohol nonionic detergent, the ester can act as a precursor for a persalt bleach included in the composition, thus obviating the need for any other conventional precursor.  
25 These esters can also lower the pour point of the composition.

When the composition for use in a product of the invention contains abrasive for hard surface cleaning  
30 (i.e. is a liquid abrasive cleaner), these will inevitably be incorporated as particulate solids. They may be those of the kind which are water insoluble. Water soluble abrasives may also be used.

35 The compositions of the invention optionally may also contain one or more minor ingredients such as fabric conditioning agents, enzymes, perfumes (including deoperfumes), micro-biocides, colouring agents, fluoescers, soil-suspending agents (anti-redeposition

agents), corrosion inhibitors, enzyme stabilizing agents, and lather depressants.

In general, the solids content of the non-aqueous cleaning composition for use in a product of the invention may be within a very wide range, for example from 1-90%, usually from 10-80% and preferably from 15-70%, especially 15-50% by weight of the final composition. The solids should be in particulate form and ideally should have an average particle size of less than 300 microns, preferably less than 200 microns, more preferably less than 100 microns, especially less than 10 microns. The particulate size may even be of sub-micron size. The proper particle size can be obtained by using materials of the appropriate size or by milling the total product in a suitable milling apparatus.

The solid phase may be dispersed in the non-aqueous cleaning compositions for use in the present invention by any means known in the art.

Preferably, the non-aqueous cleaning compositions for use in the present invention also contain one or more dispersants for modifying the rheology of the dispersion. Most preferred are the deflocculants described in European patent specification EP-A-266 199 (Unilever PLC, Case No. C 7090), for example dodecyl benzene sulphonic acid or lecithin.

Alternatively or additionally, other known dispersants which may be used are the highly voluminous inorganic carrier materials described in GB patent specifications 1 205 711 and 1 270 040, chain structure-type clays as described in EP-A-34 387 cationic quaternary amine salt surfactants, urea, a substituted-urea or -guanidine according to GB 2 179 346 or J 61 227 829, or substituted urethanes, according to J 61 227 830.

The compositions are substantially non-aqueous, i.e.

- they contain little or no free water, preferably no more than 5%, preferably less than 3%, especially less than 1% by weight of the total composition. It has been found by the applicants that the higher the water content, the more likely it is for the viscosity to be too high, or even for setting to occur. However, this may at least in part be overcome by use of higher amounts of, or more effective deflocculants or other dispersants.
- 10 Since the objective of a non-aqueous liquid will generally be to enable the formulator to avoid the negative influence of water on the components, e.g. causing incompatibility of functional ingredients, it is clearly necessary to avoid the accidental or deliberate
- 15 addition of water to the product at any stage in its life. For this reason, special precautions are necessary in manufacturing procedures and pack designs for use by the consumer.
- 20 Thus during manufacture of the liquid cleaning product, it is preferred that all raw materials should be dry and (in case of hydratable salts) in a low hydration state, e.g. anhydrous carbonate builder and sodium perborate monohydrate, where the latter is employed in the
- 25 composition. In a preferred process, the dry, substantially anhydrous solids are blended with the liquid phase in a dry vessel. In order to minimise the rate of sedimentation of the solids, this blend is passed through a grinding mill or a combination of
- 30 mills, e.g. a colloid mill, a corundum disc mill, a horizontal or vertical agitated ball mill, to achieve a particle size of 0.01 to 100 microns, preferably 0.5 to 50 microns, ideally 1 to 10 microns. A preferred combination of such mills is a colloid mill followed by
- 35 a horizontal ball mill since these can be operated under the conditions required to provide a narrow size distribution in the final product. Of course particulate material already having the desired particle size need not be subjected to this procedure and if desired, can



be incorporated during a later stage of processing.

During this milling procedure, the energy input results in a temperature rise in the product and the liberation of air entrapped in or between the particles of the solid ingredients. It is therefore highly desirable to mix any heat sensitive ingredients into the product after the milling stage and a subsequent cooling step. It may also be desirable to de-aerate the product before addition of these (usually minor) ingredients and optionally, at any other stage of the process. Typical ingredients which might be added at this stage are perfumes and enzymes, but might also include highly temperature sensitive bleach components or volatile solvent components which may be desirable in the final composition. However, it is especially preferred that volatile material be introduced after any step of aeration. Suitable equipment for cooling (e.g. heat exchangers) and de-aeration will be known to those skilled in the art.

It follows that all equipment used in this process should preferably be completely dry, special care being taken after any cleaning operations. The same is true for subsequent storage and packaging equipment.

EXAMPLE

The accompanying drawings illustrate an embodiment of a packaged product according to the invention, in which  
5 Figure 1 of the drawings is a vertical cross-section through the product showing the contents thereof, the closure member and the protective cover; and

10 Figure 2 is a perspective view from above and two sides of the same packaged product but with the contents thereof, the closure member and the protective cover removed.

The packaged product comprises a bottle shaped container  
15 1 having a neck portion 2 formed to define a relatively narrow opening. An annular lip 3 supports a disc-shaped tablet 4 constituting a closure member for the container. The tablet is made as described below. The top face of the tablet is level with the upper annular  
20 face of the neck portion 2, so that a protective cover 5 secured to the upper annular face of the neck portion lies flat against the upper face of the tablet 4.

Within the container is a non-aqueous cleaning  
25 composition 6 in an amount which represents the dose for a single wash in an automatic fabric washing machine. This amount may be from 50 ml to 250 ml and is typically about 70-90 ml. The volume of the container 1 is chosen accordingly so as to leave a free space 7 with a  
30 dimension which is optimum for efficient dispensing while maintaining the total volume of the product as low as possible.

The container 1 is formed of a semi-rigid material such  
35 as low-density polyethylene. The protective cover 5 is formed of plastics material film, secured to the container by way of releasable adhesive.

Suitable compositions for the tablet 4 are (% by weight)

<u>Table Composition:</u>		<u>A</u>	<u>B</u>	<u>C</u>
	Tartaric acid	18.4	31.0	-
	Smectite clay	-	-	38.1
5	Sodium bicarbonate	26.1	-	-
	Sodium carbonate	-	44.0	-
	Lactose	44.5	2.5	50.0
	Polyethylene glycol 6000	8.0	18.0	8.0
	Sodium benzoate	2.6	2.5	2.5
10	Magnesium stearate	0.4	0.4	0.4
	Polyvinylpyrrolidone	-	1.5	-
	Perfume	-	0.1	1.0

The polyethylene glycol, sodium benzoate and magnesium stearate are used to obtain a strong homogeneous tablet, which is produced by compressing a dry mixture of the ingredients. The weight of the tablet was 2.0 g.

Suitable non-aqueous liquid cleaning compositions are (% by weight)

<u>Tablet Composition:</u>		<u>D</u>	<u>E</u>	<u>F</u>
	Nonionic surfactant <sup>1</sup>	27.5	33.0	30.0
	Glyceryl triacetate	12.5	14.0	13.0
25	ABS acid <sup>2</sup>	4.0	4.0	4.0
	Soap	2.0	-	-
	Silica <sup>3</sup>	0.3	-	-
	Sodium tripolyphosphate	-	-	30.0
	Sodium carbonate	27.5	18.0	2.0
30	Sodium bicarbonate	-	4.0	-
	Sodium disilicate	3.5	-	2.0
	Calcite (Sokal U3 ex Solvay)	-	8.0	-
	Sodium perborate monohydrate	11.0	11.0	11.0
	TAED	4.0	3.0	3.0
35	CP5 polymer <sup>4</sup>	4.0	-	-
	Minor ingredients	<-----balance----->		

Notes

- 1        -        Such as PLURAFAC RA30 which is a C<sub>13/15</sub> fatty  
5                alcohol alkoxylated with an average of 4 to 5  
              moles ethylene oxide and 2 to 3 moles  
              propylene oxide (ex ICI).
- 2        -        Alkyl (ie. dodecyl) benzene sulphonic acid (as  
10                free acid).
- 3        -        Highly voluminous silica (Aerosil).
- 4        -        SOKALAN CP5 which is an acrylic acid/maleic  
15                acid copolymer in the sodium salt form with an  
              average molecular weight of 70,000 and an  
              acrylic acid : maleic acid ratio of 1:1 (ex  
              BASF).

20        The volume of this composition in the container was 90  
              ml(120g), while the overall container volume was 120 ml.

25        In use, the protective cover 5 is removed by the  
              consumer and the product is then placed in the drum of  
              an automatic washing machine, together with a fabric  
              load. The machine washing cycle is started and as the  
              wash liquor comes in contact with the tablet 4 the  
              latter fizzes and disintegrates. The movement of the  
              machine drum causes the container to topple over,  
              discharging the cleaning composition into the wash  
30        liquor. The wash cycle continues in the usual manner and  
              at the end thereof the empty container 1 is removed from  
              the machine together with the clean fabric load.

CLAIMS

1. A packaged non-aqueous liquid cleaning product comprising a container and a non-aqueous liquid cleaning composition therein, the container being closed by a water-soluble or water-dispersible closure member.
2. A product according to claim 1 wherein the closure member comprises one or more ingredients selected from detergency builders, bleach precursors, peroxygen or peracid bleaches, enzymes, polymers for controlling the deposition of soil or insoluble particulate material onto the articles to be cleaned, foam inhibitors and perfumes.
3. A product according to claim 1 wherein the closure member comprises a water-soluble solid acid and a water-soluble carbonate or bicarbonate salt.
4. A product according to claim 1 wherein the closure member comprises a swellable material, which will swell in contact with water thereby serving to hasten the disintegration of the closure member.
5. A product according to claim 1, wherein the closure member is a tablet.
6. A product according to claim 1, wherein the non-aqueous liquid cleaning composition comprises a polyalkoxylated nonionic surfactant.
7. A product according to claim 1 containing from 50-250 ml of the non-aqueous liquid cleaning product.
8. Use of a packaged non-aqueous liquid cleaning product according to claim 1 in the washing of fabrics in a washing machine.

9. Use according to claim 8 wherein one packaged non-aqueous liquid cleaning product is used per wash cycle.

[received by the International Bureau  
on 2 October 1990 (02.10.90);  
original claims 1, 3 and 4 replaced by  
amended claim 1; claim 2 unchanged; claims 5-9  
unchanged but renumbered as claims 3-7 (1 page)]

1. A packaged non-aqueous liquid cleaning product comprising a container and a non-aqueous liquid cleaning composition therein, the container being closed by a water-soluble or water-dispersible closure member, wherein the closure member comprises a water-soluble solid acid and a water-soluble carbonate or bicarbonate salt, or the closure member comprises a swellable material, which will swell in contact with water thereby serving to hasten the disintegration of the closure member.
2. A product according to claim 1 wherein the closure member comprises one or more ingredients selected from detergency builders, bleach precursors, peroxygen or peracid bleaches, enzymes, polymers for controlling the deposition of soil or insoluble particulate material onto the articles to be cleaned, foam inhibitors and perfumes.
3. A product according to claim 1, wherein the closure member is a tablet.
4. A product according to claim 1, wherein the non-aqueous liquid cleaning composition comprises a polyalkoxylated nonionic surfactant.
5. A product according to claim 1 containing from 50-250 ml of the non-aqueous liquid cleaning product.
6. Use of a packaged non-aqueous liquid cleaning product according to claim 1 in the washing of fabrics in a washing machine.
7. Use according to claim 6 wherein one packaged non-aqueous liquid cleaning product is used per wash cycle.

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Fig. 1.

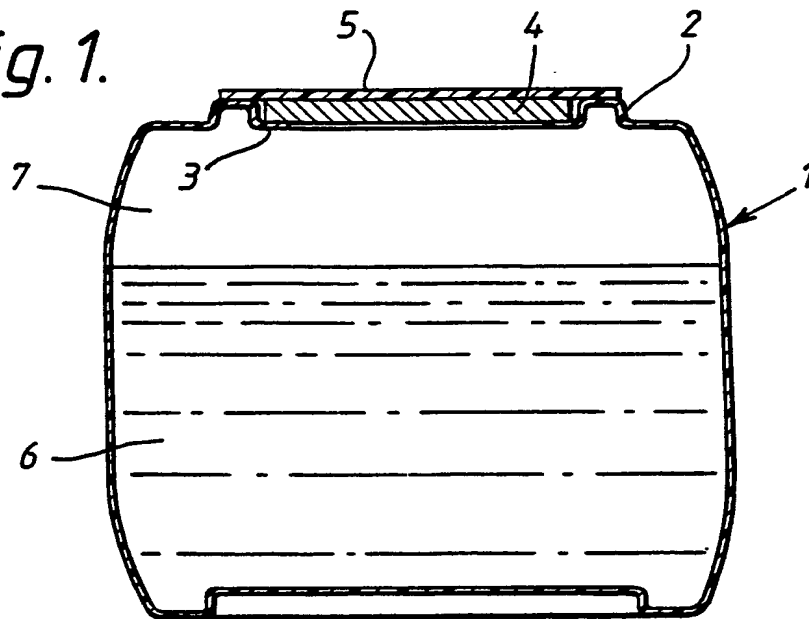
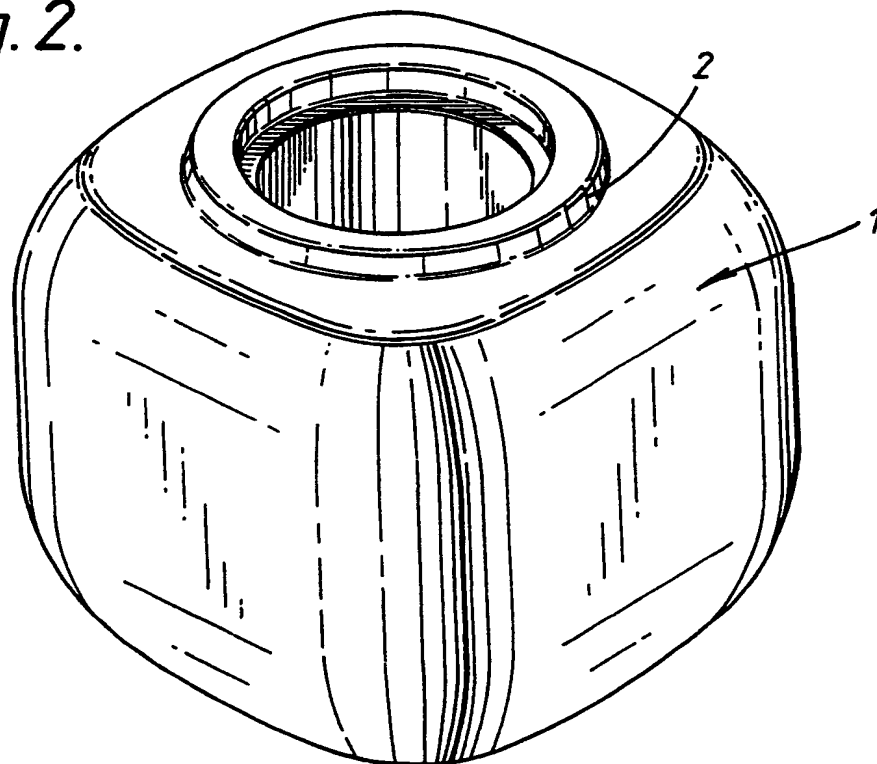


Fig. 2.



SUBSTITUTE SHEET



## INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 90/00525

**I. CLASSIFICATION OF SUBJECT MATTER** (If several classification symbols apply, indicate all)<sup>6</sup>

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 C11D17/04 ; C11D17/00 ; D06F39/02

**II. FIELDS SEARCHED**Minimum Documentation Searched<sup>7</sup>

Classification System

Classification Symbols

Int.Cl. 5

C11D ; D06F

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched<sup>8</sup>**III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup>**

Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	US,A,3399806 (M. LUCAS) 03 September 1968 see column 2, lines 24 - 59; claim 1; figures 1, 2, 5 ---	1, 8, 9
A	EP,A,266199 (UNILEVER) 04 May 1988 see page 15, line 57 - page 6, line 44, example 1 (cited in the application) ---	1, 7
A	EP,A,79712 (CLOROX) 25 May 1983 see claims 1-8 ---	1, 2
P,X	FR,A,2626589 (S. BISE) 04 August 1989 see page 3, lines 7 - 24; claims 1, 7, 8; figure 3 ---	1, 8, 9

<sup>10</sup> Special categories of cited documents:<sup>"A"</sup> document defining the general state of the art which is not  
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citation or other special reason (as specified)<sup>"O"</sup> document referring to an oral disclosure, use, exhibition or  
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later than the priority date claimed<sup>"T"</sup> later document published after the international filing date  
or priority date and not in conflict with the application but  
cited to understand the principle or theory underlying the  
invention<sup>"X"</sup> document of particular relevance; the claimed invention  
cannot be considered novel or cannot be considered to  
involve an inventive step<sup>"Y"</sup> document of particular relevance; the claimed invention  
cannot be considered to involve an inventive step when the  
document is combined with one or more other such docu-  
ments, such combination being obvious to a person skilled  
in the art.<sup>"A"</sup> document member of the same patent family**IV. CERTIFICATION**

Date of the Actual Completion of the International Search

23 AUGUST 1990

Date of Mailing of this International Search Report

20. 09. 90

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

PFANNENSTEIN H.

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.**

EP 9000525  
SA 35773

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on  
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23/08/90

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